Accelerating Infrastructure Innovations

FOCUS

A special Focus on Asset Management

March 2003

INSIDE

U.S. Department of Transportation
Federal Highway Administration

Asset Management Leads the Way to Customer Satisfaction

by Dave Geiger

In 1999, with the establishment of its Office of Asset Management, the Federal Highway Administration (FHWA) made a strong commitment to bring Transportation Asset Management (TAM) to the Nation's transportation agencies. This remains a top priority for FHWA. As we have seen, TAM leads to reductions in the total life-cycle costs of providing transportation services, and improvements in safety, system reliability and condition, and financial performance.

TAM is a strategic approach to allocating resources—dollars, people, and data—for the preservation, operation, and management of our Nation's transportation infrastructure. What exactly does this mean? It's common sense. It's a way of thinking that enables agency leadership to comprehensively view the big picture before making decisions as to where specific resources should be deployed. With TAM, agency leaders will better know the landscape of their business and will be prepared to distribute resources so that the agency can maximize customer satisfaction. Customer satisfaction may be measured via a number of different metrics to include value in dollars (i.e., return on investment), or other measures of performance.

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The transportation community has made great strides in developing and utilizing management systems to make better decisions. However, in the past, when one investment option was compared to another, it was generally within the confines of a particular asset class. Comparisons across asset classes—for example, pavements versus structures—were rarely, if ever, made. TAM provides the approach and tools to make decisions that are the best from the total transportation system perspective.

FHWA's strategy for advancing TAM focuses on people, information, tools, and deployment. On the people front, we have paid particular attention to providing information and training on both Asset Management tools and comprehensive Asset Management. In terms of information, our office assists agencies in obtaining the data they need to make TAM-based decisions. Tools that support the comparison of investment options are critical to making TAM possible. Accordingly, we have developed and/or refined many of the technical and analytical components of TAM. For example, we

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Putting Economic Analysis to Work for You

How do you know if a highway project is worth doing, or when it should be done, or what the most cost-effective means of accomplishing it are? Economic analysis tools can provide answers to these questions when coordinated with transportation planning, engineering, environmental review, and policymaking as part of the Transportation Asset Management (TAM) process.

Although the idea of comparing the benefits and costs of transportation projects on a dollar-to-dollar basis has long appealed to decisionmakers, applying economic analysis to such projects has often not been the reality. Agencies may believe that transportation benefits and costs are too hard to quantify and value, or too subject to uncertainty to provide meaningful guidance. However, increased research on economic methods and values, combined with improved modeling of traffic and uncertainty, has resulted in more States using economic analysis tools and made the widespread use of economic analysis for highway projects an attainable goal.

"The citizens and taxpayers that use our transportation systems expect excellence, integrity, reliability, and sustainability to be reflected in the decisions public officials implement on their behalf. Further development and more widespread use of technical tools to quantify the economic efficiency of proposed investment alternatives will help transportation executives meet these expectations," says New York State Transportation Commissioner Joseph H. Boardman.

Most, if not all, of the costs and benefits of a project can be quantified in dollars for each year of its life cycle. A project's costs usually include those associated with its planning, design, construction, and maintenance. These costs can be estimated through engineering methods and refined using value engineering techniques. Project benefits, meanwhile, usually include improvements in travel times, vehicle operating costs, and/or safety. Dollar values can be assigned to these benefits based on travelers' wages, actual costs, and/or the amount travelers would be willing to pay for the benefits. Reduced travel time often accounts for the greatest share of a project's benefits, potentially affecting traffic flows throughout the regional road network. Improvements in travel time also contribute to indirect effects such as changes in regional accessibility, land values, and economic development. The economic assessment should also address the cost of delay to travelers at project-related work zones.

Increased research on economic methods and values has made the widespread use of economic analysis for highway projects an attainable goal.

The appropriate economic analysis tool to evaluate a specific project depends on what your needs are. For example, life-cycle cost analysis (LCCA) deals solely with project costs. LCCA is used when an agency has already decided to undertake a project (e.g., a bridge must be reconstructed), but there are two or more alternative means to accomplish the project. If each alternative would produce the same user benefits, then the economically superior alternative would be the one with the lowest life-cycle costs. The Federal Highway Administration (FHWA) has developed guidance on using LCCA for pavement design, including an interim technical bulletin, training, and software (see sidebar).

However, LCCA cannot be used to evaluate a project where benefits among possible alternatives are not identical, or where an agency's decision to pursue a project depends on the amount of benefits it generates. The appropriate economic tool to use in these instances is benefit-cost analysis (BCA), which considers life-cycle benefits as well as life-cycle costs.

LCCA Resources

Life-cycle cost analysis (LCCA) resources available from FHWA include the LCCA software and an accompanying instructional workshop. The software identifies cost differences between design alternatives, accounting for both initial and future agency and user costs. Hands-on experience with the software can be gained at the new FHWA LCCA workshop, which presents the basics of how to conduct an LCCA and how to apply the results to pavement project design decisions. Other resources include a *Life-Cycle Cost Analysis Technical Bulletin* and *Life-Cycle Cost Analysis Primer*, which can be downloaded from www.fhwa.dot.gov/infrastructure/asstmgmt/lcca.htm.

For more information on LCCA, to obtain a copy of the software, or to schedule the workshop, contact Tom Canick at FHWA, 202-366-4567 (email: tom.canick@fhwa.dot.gov).

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Applying BCA requires planners, engineers, economists, and environmental and policy experts to work together. The analysis team must specify clear objectives for a potential improvement in the highway system and develop a full set of reasonable alternatives to meet the objectives. The team should then measure all benefits and costs that differ between each improvement alternative and a continuation of the status quo. The best alternative from an economic point of view will usually be the one where benefits most exceed costs. However, "factors such as policy issues, funding availability, and risk will also affect the ultimate ranking of alternatives and the decision as to which is the best one," says Eric Gabler of FHWA.

Agencies may apply economic analysis to highway assets on a case-by-case basis or at the program level. To optimize BCA at the program level, FHWA developed the Highway Economic Requirements System–State Version (HERS-ST) software program. HERS-ST enables agencies to evaluate the implications of alternative program budgets and policies on the conditions, performance, and user cost levels associated with their highway systems.

In addition, large highway projects often have significant impacts on regional traffic patterns and economic development. The information provided by BCA about such projects can be significantly enhanced if the BCA is performed in coordination with regional travel demand modeling, environmental assessment, and economic impact analysis. Travel demand models enable the analysis team to balance estimates of the future traffic demand and supply that will occur with and without the project, allowing more accurate forecasts of the project's effects on travel times. Environmental assessments often reveal significant costs or benefits for inclusion in the BCA. And economic impact analysis uses information from the BCA to measure how the direct transportation benefits and costs of the project would affect regional accessibility, jobs, tourism, land values, and economic development. It also provides important information on the distribution of benefits and costs among different demographic groups.

Ultimately, economic analysis informs decisionmakers and the public about the real-world effects of highway investments. In coordination with other analysis disciplines, it identifies and values the benefits, costs, and other user impacts of highway projects. It also allows highway agencies to target scarce resources to their best uses in terms of maximizing public welfare and to account publicly for those decisions. As a result, "FHWA strongly supports the incorporation of economic analysis into highway decisionmaking as part of the TAM process," says Dave Geiger of FHWA.

For more information on the use of economic analysis for highway decisionmaking, contact Eric Gabler at FHWA, 202-366-4036 (fax: 202-366-9981; email: eric.gabler@fhwa.dot.gov). More information on economic analysis can be found on the Web at www.fhwa.dot.gov/infrastructure/asstmgmt/invest.htm. The HERS-ST software program can also be downloaded from this site. *

developed a new management system for tunnels, and economics-based software packages to support program- and project-level decisions (see article, page 2). Finally, we serve as consultants to transportation agencies as they work to deploy TAM. We're committed to deployment because that's the only way to realize real-world benefits.

Although TAM takes place at the highest level of a transportation agency, the individual concepts and principles underlying this decision-making framework may be usefully applied at any level and to any decision affecting the transportation system. For example, FHWA has placed a major emphasis on applying TAM concepts and principles to system preservation (see article, page 5). When identifying and evaluating resource allocation options, preservation is among an agency's most important considerations. Pursuing a preventative maintenance strategy rather than waiting for roads to deteriorate before fixing them can extend the useful life of a pavement by many years at a considerably lower life-cycle cost than that of conventional pavement rehabilitation or reconstruction.

This is an exciting, yet challenging time for the transportation community. We have worked hard with our partners—particularly the American Association of State Highway and Transportation Officials and the Transportation Research Board—to build the conceptual foundation for TAM. Working together we can make Asset Management a reality.

Dave Geiger is the Director of FHWA's Office of Asset Management. *

Transportation Asset Management: Join the Community

Informative, comprehensive, and easy to use: the new Transportation Asset Management Today Web site is all of this and more, bringing together people and information in a virtual community of practice. Open to all, the site (assetmanagement.transportation.org) is dedicated to the exchange of information and knowledge about transportation asset management (TAM). The community of practice (COP) is sponsored by the American Association of State Highway and Transportation Officials (AASHTO), with support from the Federal Highway Administration and the Transportation Research Board.

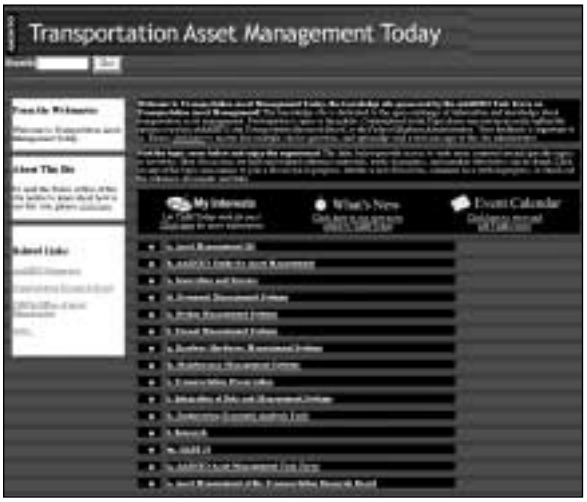
Users can look up reference documents, initiate a discussion or join one already underway, or comment on a work-in-progress document that has been posted. "I encourage site users to create new discussion items by asking questions or sharing their experiences, respond to existing discussion items, and email suggestions for reference library additions to each topic area facilitator," says site Webmaster Lou Adams of the New York State Department of Transportation. Topic areas include:

- Asset Management 101
- Pavement Management Systems
- Bridge Management Systems
- Engineering Economic Analysis Tools
- Integration of Data and Management Systems
- Research
- GASB 34 (Financial Valuation of Assets)
- Tunnel Management Systems
- Roadway Hardware Management Systems
- Maintenance Management Systems
- AASHTO Asset Management Task Force
- Asset Management at the Transportation Research Board
- Public Transportation
- Performance Measures
- Local Government Perspectives
- Education.

"Each topic area is hosted by a volunteer facilitator who is a subject matter expert for the topic and who assures that site users receive timely and noteworthy content," says Adams. Each of the various topics also offers a directory section, which lists names and contact information for those who have joined the COP.

Other site features include an events calendar and a notification service, which allows users to receive daily email notification that new items falling under their particular interest areas have been posted.

For more information on the COP, contact Lou Adams at 518-457-1716 (email: ladams@dot.state.ny.us). *



Enter the World of Asphalt

The state-of-the-art in asphalt technology will be on display at the World of Asphalt 2003 Show and Conference, scheduled for March 17–20, 2003, in Nashville, Tennessee. The event will include exhibits, live paving demonstrations, and a range of educational programs. Running in conjunction with the World of Asphalt is the Asphalt Pavement Conference: Superpave 2003, which is sponsored by the Asphalt Pavement Alliance (APA). The APA is an industry coalition comprised of the Asphalt Institute (AI), National Asphalt Pavement Association (NAPA), and the State Asphalt Pavement Associations (SAPA). The Superpave conference is supported by the Federal Highway Administration, American Association of State Highway and Transportation Officials (AASHTO), Transportation Research Board (TRB), and the Tennessee Department of Transportation (DOT).

The Asphalt Pavement Conference: Superpave 2003 will highlight a decade of evolution and improvement in the Superpave system, looking at such topics as mix design and performance testing; production, placement, and compaction; and the impact of the AASHTO *2002 Design Guide*. "We're focusing on all aspects of Superpave, including design, construction, and what the future holds," says Kent Hansen of NAPA. "And it's not just highways or freeways—We're looking at the use of Superpave for local roads and airports too."

Asphalt Pavement Conference participants receive free registration for the World of Asphalt, where more than 150 exhibitors will present the latest equipment and services, including asphalt production and recycling equipment,

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Pavement Preservation Training: How to Make the Most of Your Highway Investment

As transportation agencies across the country make decisions about spending limited highway dollars, they are looking for a high payoff in terms of maximizing resources and optimizing the return on their investment. With the Interstate system completed and much of the National Highway System exceeding its design service life, these decisions are increasingly focused on maintaining and preserving the Nation's $1 trillion dollar investment in existing highway infrastructure assets. To accomplish this goal, many agencies are now considering a wider range of actions to take to maintain and preserve their transportation infrastructure. In response to State and industry needs, the Federal Highway Administration (FHWA) has developed a series of pavement preservation training courses to provide guidance in this area of asset management.

Two courses are currently being offered to highway agencies through FHWA's National Highway Institute (NHI), while two more are expected to be available by this fall. The development and presentation of the courses has been supported by industry and the Foundation for Pavement Preservation. *Pavement Preservation: The Preventive Maintenance Concept* introduces the overall concepts of pavement preventive maintenance. Its target audience is highway agency decisionmakers, management, senior maintenance staff, and others who have the ability to create and fund department programs and initiatives. The course highlights components of a preventive maintenance program, provides an overview of treatments and techniques, and explores the use of life-cycle cost analyses to promote preventive maintenance. The course also makes extensive use of case study information collected from visits and interviews with five pavement preservation Lead States. Since November 2000, the course has been presented 32 times in 17 States. "The popularity of the course underscores a widespread interest in learning more about implementing or improving preventive maintenance practices at both the State and local level," says Jim Sorenson of FHWA.

The North Carolina Department of Transportation places a chip seal, which is one of the pavement preservation practices covered in FHWA's new training courses.

"We have sent all engineering managers in the field at the division, district, and county levels to both courses," says Steve Varnedoe, State Maintenance and Equipment Engineer for the North Carolina Department of Transportation. "These courses have been very effective in helping to bring about a cultural change in the organization regarding the value of pavement preservation. We believe getting buy in and an understanding of the concepts of pavement preservation at all levels of management is essential for an agency to sustain a pavement preservation program."

Selecting Pavements for Preventive Maintenance targets engineers and field supervisors who make decisions about which roads receive treatment and when. The course provides guidance on identifying when pavements are candidates for preventive maintenance, learning how to identify appropriate preventive maintenance treatments, and understanding all of the factors that need to be considered to select the most appropriate treatment. Also featured are hands-on exercises that test participants' abilities to identify appropriate candidate pavements for preventive maintenance, select feasible treatments, and analyze cost and performance data to identify the best treatments to use. Since November 2001, the course has been presented 24 times in 11 States.

The third course, *Design and Construction of Quality Preventive Maintenance Treatments*, is under development. "This course is probably the most eagerly anticipated among both agencies and contractors," says Sorenson. It targets those field personnel involved in constructing preventive maintenance treatments, such as agency inspectors and contractor foremen. The course includes modules on all of the different types of preventive maintenance treatments now in use, focusing on best practices for designing and constructing those treatments. It also addresses poor practices and their resulting impacts. As with the other courses, it is being developed by Applied Pavement Technology, Inc., in close collaboration with industry organizations and contractors. "They are providing their own training materials and storehouse of technical knowledge and experience to help ensure that the resultant training course is accurate and useful," says Sorenson.

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Highway Technology Calendar

The following events provide opportunities to learn more about products and technologies for accelerating infrastructure innovations.

Asphalt Pavement Conference: Superpave 2003
March 17–19, 2003, Nashville, TN

The conference is being held in conjunction with the World of Asphalt 2003. Attendees will focus on the Superpave system's evolution and improvement over the last decade, as well as what the future holds.

Contact: World of Asphalt Management Office at 800-355-6635 (fax: 800-979-3365; email: info@worldofasphalt.com).

World of Asphalt 2003
March 17–20, 2003, Nashville, TN

The conference will feature educational sessions, outdoor demonstrations, and indoor exhibits showcasing the latest asphalt-related equipment, products, and services. Sponsors include the American Association of State Highway and Transportation Officials (AASHTO), Federal Highway Administration (FHWA), Transportation Research Board (TRB), and the National Asphalt Pavement Association.

Contact: World of Asphalt Management Office at 800-355-6635 (fax: 800-979-3365; email: info@worldofasphalt.com).

2002 Pavement Design Guide and Traffic Data Workshop
March 25–26, 2003, Las Vegas, NV

Sponsored by FHWA's Midwestern and Western Resource Centers, the workshop will discuss issues and challenges in implementing the *2002 Pavement Design Guide* and the 2001 *Traffic Monitoring Guide*.

Contact: Byron Low at FHWA, 708-283-3536 (email: byron.low@fhwa.dot.gov), or Lorrie Lau at FHWA, 415-744-2628 (email: lorrie.lau@fhwa.dot.gov).

2003 Design-Build Transportation Conference
April 2–4, 2003, Marina del Rey, CA

The conference will focus on current design-build issues, best practices, and challenges facing owners and practitioners in the design-build industry. The event is sponsored by the Design-Build Institute of America (DBIA), AASHTO, FHWA, and the American Society of Civil Engineers.

Contact: DBIA at 202-682-0110 (Web: www.dbia.org).

Ninth International Bridge Management Conference
April 28-30, 2003, Orlando, FL

The conference is being sponsored by the TRB Committee on Bridge Management Systems, in cooperation with FHWA. The event will provide a forum for the exchange of information on all aspects of highway bridge management.

Contact: Frank Lisle at TRB, 202-334-2950 (fax: 202-334-2003; email: flisle@nas.edu).

National Conference: Best Practices, Care, and Repair of Covered Bridges
June 5–7, 2003, Burlington, VT

The conference will feature separate tracks for engineers and architects; contractors and others responsible for the repair and maintenance of covered bridges; and municipal officials, State transportation staff, and other stewards of covered bridges.

Contact: Judy L. Hayward at the Preservation Education Institute, 802-674-6752 (email: coveredbridges@uvm.edu).

SAVE International Conference
June 7–11, 2003, Scottsdale, AZ

SAVE is devoted to the advancement of value methodology, including techniques used in value engineering and value analysis. Its 43rd annual conference will focus on global leadership through value enhancement.

Contact: Mark Leuthold or Claire Lea at SAVE International, 937-224-7283 (email: info@value-eng.org).

2003 International Bridge Conference
June 9–11, 2003, Pittsburgh, PA

Conference topics range from bridge maintenance programs to innovative design concepts and rapid construction.

Contact: Engineers Society of Western Pennsylvania, 412-261-0710 (fax: 412-261-1606; email: conf@eswp.com).

2003 AASHTO Value Engineering Conference
July 15–18, 2003, Tampa, FL

This one-stop source of information will cover the transportation industry's best practices for value engineering.

Contact: Kurt Lieblong at the Florida Department of Transportation (DOT), 850-414-4787 (fax: 850-414-4796; email: kurt.lieblong@dot.state.fl.us) or Ellen Sliger at Florida DOT, 850-414-4795 (fax: 850-414-4796; email: ellen.sliger@dot.state.fl.us). Information is also available on the Web at www11.myflorida.com/qualityinitiativesoffice/projectmgmt/value.htm.

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milling machines, compaction equipment, and testing devices. A live paving demonstration will showcase correct paving techniques, covering topics such as job planning, surface preparation, smoothness measurement, safety, and traffic control.

The education program at the World of Asphalt will also feature the People, Plants, and Paving Training Program, which details effective paving techniques, information on improving plant operation and performance, how to better manage a workforce for greater productivity, and how to raise employee awareness of work zone safety. These sessions are targeted to paving superintendents, plant superintendents, and other middle managers.

World of Asphalt 2003 is supported by AASHTO, FHWA, TRB, SAPA, NAPA, the Tennessee DOT, Tennessee Road Builders Association, National Association of County Engineers, American Road and Transportation Builders Association, and the Asphalt Emulsion Manufacturers Association. Additional supporters include the Asphalt Institute, Asphalt Recycling and Reclaiming Association, Association of Equipment Manufacturers, the Rubber Pavements Association, the International Slurry Surfacing Association, and a number of international organizations.

For more information or to register, visit the World of Asphalt 2003 Web site at www.worldofasphalt.com or contact the World of Asphalt Management Office at 800-355-6635 (fax: 800-979-3365; email: info@worldofasphalt.com). ✻

Pontis Training: It's Interactive

Coming soon…an interactive Pontis training CD. The Pontis program, which is part of the American Association of State Highway and Transportation Officials' (AASHTO) BRIDGEWare line of software, can be used by highway agencies to organize their bridge data and analyze complex engineering and economic factors. The initial versions of Pontis were designed and developed by FHWA in cooperation with the California Department of Transportation, under a joint venture between Cambridge Systematics and Optima. The most recent version, 4.1, was released in 2002.

The CD will serve as an introduction to Pontis for those not familiar with the program and a refresher for those who have taken the National Highway Institute (NHI) training course, *Pontis Bridge Management* (Course No. 13056A). The CD will include 2-D animation illustrating the principles of the Pontis program and presentations featuring the Pontis user interface in action. "This product will be a great marketing tool for Pontis," says George Romack, FHWA's Senior Bridge Management Engineer. "We expect the CD to be available this spring on the Asset Management Community of Practice Web site [assetmanagement.transportation.org], which is sponsored by AASHTO, with support from FHWA and the Transportation Research Board."

Since July 2002, nine NHI training sessions have been held as part of FHWA's effort to promote the use of Pontis and its full implementation by States. The 2 1/2-day course, developed by FHWA in partnership with AASHTO, offers a hands-on learning experience. Participants use the Pontis database and the program's analysis tools to develop goals, strategies, and projects. Participants also learn about performance measures and how the program's reporting capabilities can be used to define goals and track results. The course is taught by engineers from the FHWA Resource Centers and Office of Asset Management.

For more information about the forthcoming CD or the NHI training course, contact George Romack at FHWA, 202-366-4606 (email: george.romack@fhwa.dot.gov). To schedule the course, contact Danielle Mathis-Lee at NHI, 703-235-0528 (email: danielle.mathis-lee@fhwa.dot.gov). The Pontis license structure provides for several levels of technical support from the Pontis Support Center at 617-354-0167 (fax: 617-354-1542; email: pontis@camsys.com; Web: aashtoware.camsys.com). To obtain information on licensing Pontis, contact Angelique Williams at AASHTO, 202-624-5808 (email: angelw@aashto.org). ✻

Pontis can be used by highway agencies to organize their bridge data.

FOCUS

Focus (ISSN 1060-6673), which is published monthly by the U.S. Department of Transportation's Federal Highway Administration (FHWA), covers the implementation of innovative technologies in all areas of infrastructure.

Its primary mission is twofold: (1) to serve the providers of highway infrastructure with innovations and support to improve the quality, safety, and service of our roads and bridges; and (2) to help promote and market programs and projects of the various offices of FHWA's Office of Infrastructure.

FHWA Administrator: Mary E. Peters

Managing Editor: Zachary Ellis
Tel: 202-493-3193 (fax: 202-493-3475)
zac.ellis@fhwa.dot.gov

Editor: Lisa Pope
Tel: 202-347-1448 (fax: 202-347-6938)
lgpope@woodwardcom.com

Federal Highway Administration (HRTS)
6300 Georgetown Pike
McLean, VA 22101-2296

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Send address corrections to:
Woodward Communications
733 15th St., NW, Suite 500
Washington, DC 20005
fax: 202-347-6938
email: lgpope@woodwardcom.com

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Pavement Preservation,

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The final course in the Pavement Preservation series, *Pavement Preservation: Integrating Pavement Preservation Practices and Pavement Management*, focuses on finding the common ground that needs to exist between preventive maintenance and pavement preservation practices and pavement management programs. Much of the responsibility for pavement preservation activities rests with an agency's maintenance division at the local or district level. Such activities mirror pavement management ones in many ways, but they often take place outside of the agency's pavement management framework. Not only may there be costly duplication of effort, but all of the benefits of preventive maintenance are not realized if it is not done in concert with pavement management.

The course addresses technical issues of integration, such as performance indicators, data collection, treatment selection, and software needs and capabilities, as well as the need to enhance interagency communication and agency organization. The course objectives also include:

- Describing the characteristics and goals of a pavement management system (PMS), including the difference between network-and project-level decisions.
- Demonstrating how preventive maintenance and other pavement preservation practices affect pavement performance and how these treatments should be incorporated into pavement management models.
- Describing how an enhanced or integrated PMS can be used to support asset management decisions by demonstrating the long-term cost effectiveness of preventive maintenance programs and how these programs can be used to achieve agency pavement condition goals.

To schedule the two courses currently available, contact Danielle Mathis-Lee at NHI, 703-235-0528 (email: danielle.mathis-lee@fhwa.dot.gov). For more information about the Pavement Preservation course series, contact Ewa Rodzik at NHI, 703-235-0524 (email: ewa.rodzik@fhwa.dot.gov) or your local FHWA Division Office. *

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